

DOES EXERGAMING AUGMENT LUNCHTIME PHYSICAL ACTIVITY IN PRIMARY SCHOOL CHILDREN?

Michael J. Duncan and Samantha L. Birch

Coventry University, UK

E-mail: michael.duncan@coventry.ac.uk.

Aims and Objectives

The aim of this project was to assess physical activity levels during active video game play over a 6 week period in primary school children.

The objectives of this project were:

- To determine whether the type of exergaming system: the Nintendo Wii and the Gamercize Power Stepper were effective in promoting school time PA
- To determine whether exergaming offered any additional value as a PA tool compared to 'free play' associated with recess/lunchbreak activity.

Outline of Project

- The Project used a quasi-experimental intervention design whereby children (51 children, 24 boys, 27 girls, mean age \pm S.D. = 10.8 ± 0.4 years) from three primary schools in England were randomly allocated to intervention or control groups (n = 17 per group).
- Two intervention groups each undertook twice weekly active video gaming sessions during school lunch breaks for 6 weeks (See Figure 1.).
- One group engaged in Nintendo Wii based activity and the other engaged in Gamercize Power Stepping activity with an XBOX360.
- A control group participated in their 'regular' lunch break activity.

Project Partners and Funding

In addition to Coventry University, Coventry City Council and the individual schools involved in the project worked together as partners.

As this project was exploratory the only costs were purchase of the active videogaming equipment (approx £2500). The sessions were run by volunteers in school.



Figure 1. Example Exergame Play

Rationale for the Project

- Research has suggested that exergaming has potential to enhance children's habitual physical activity (e.g., Duncan and Staples, 2010).
- The majority of this data is based on studies examining acute bouts of exergaming and authors (Foley and Maddison, 2010) have stressed a need for intervention studies to establish whether exergaming has potential to enhance physical activity in the longer term.
- Likewise, there has been a diversification in the type and nature of active exergaming systems available and there is little information available documenting whether different active gaming platforms result in different physical activity responses.
- This study sought to investigate these issues in a ecologically valid setting.

References

- Duncan, M. J., & Staples, V. (2010). *Human Movement*, 11, 95-99.
- Foley, L., & Maddison, R. (2010). *Pediatric Exercise Science*, 22, 7-20.
- Ridgers, N. D., et al. (2006). *Preventive Medicine*, 42, 372-374.

Evaluation and Research Methodology

- Physical activity was assessed at lunch break during the first, third and sixth weeks of the 6-week period for both groups using pedometry and heart rate monitoring. Pedometer determined physical activity was assessed using a sealed, piezo-electric pedometer (New Lifestyles, NL2000, Montana, USA).
- Heart rate data was collected using Polar RS400 heart rate monitors (Polar Electro, OY, Finland), covered with a purpose built shield. Heart rate reserve (HRR) values of 50 (HRR₅₀) and 75 (HRR₇₅) percent were used as threshold values to represent moderate-to-vigorous physical activity (MVPA) and in agreement with prior studies of children's recess based activity (Ridgers, et al., 2006).

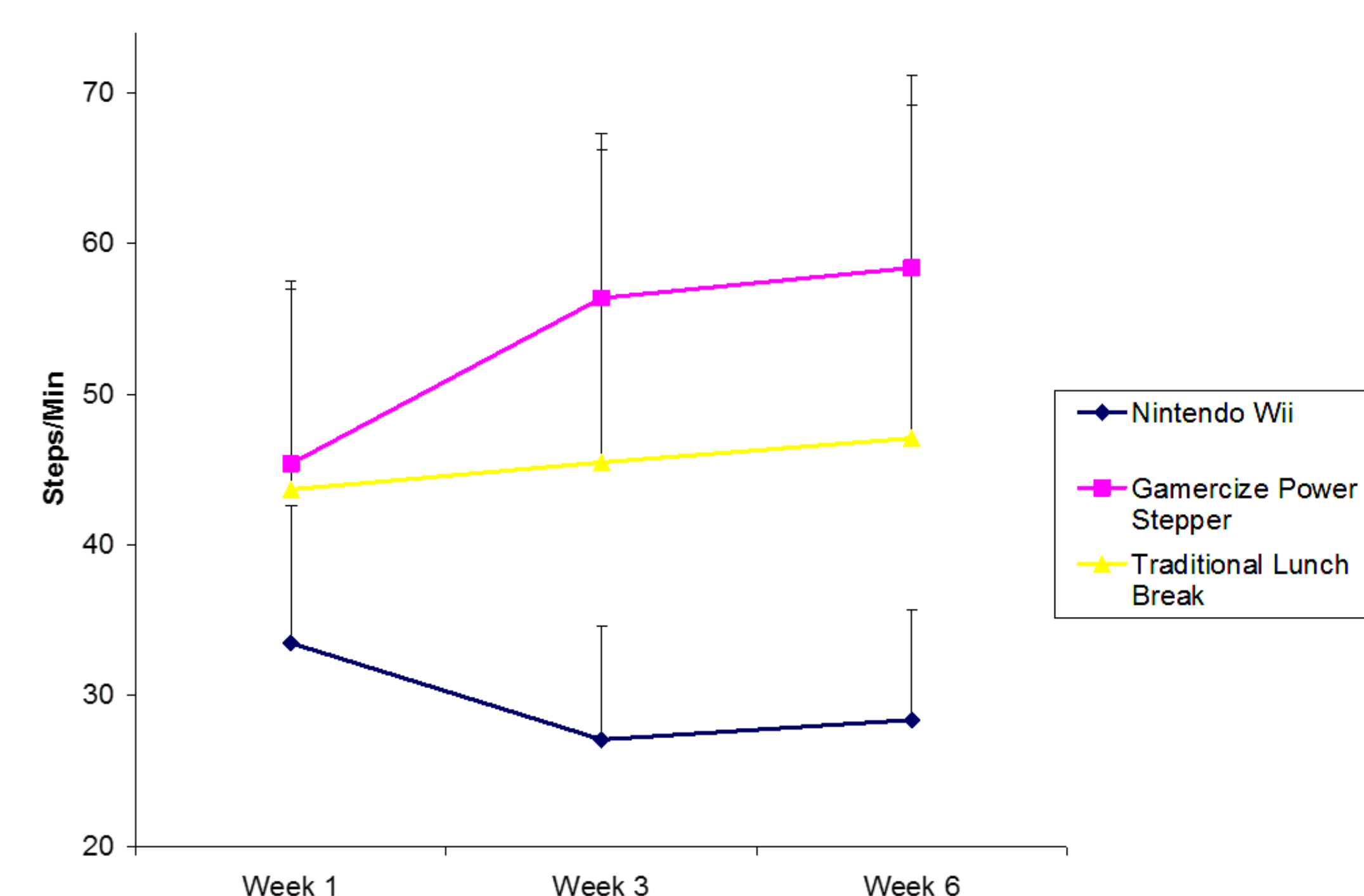
Statistical Analysis

Any differences in physical activity across the 6-week period and between intervention and control groups were examined using 3 (Measurement period) by 3 (group) repeated measures Analysis of Covariance (ANCOVA) controlling for body mass index. The dependant variables were the percentage of time spent in MVPA, average heart rate and the steps/min taken at each measurement point. The statistical package for social sciences (Version 17) was used for all analysis and the alpha level was set at $P < 0.05$.

Results

- Repeated measures analysis of covariance (controlling for body mass index) was used to examine any differences in PA, determined by pedometry and heart rate monitoring.
- Children in the Nintendo Wii condition participated in significantly less ambulatory PA across the 6 week period compared to the Gamercize Power Stepper and Control groups ($P = .0001$, See Figure 2).
- There were no significant differences in ambulatory PA between Gamercize Power Stepper and control conditions.
- There were also no significant differences in the percentage of time spent in Moderate to Vigorous PA across groups or over time ($P < .05$).
- Active video game play at lunchbreaks, using the Gamercize power stepper, appears to be similar to PA levels during traditional school lunchbreak over a 6 week period.
- Active gaming using the Nintendo Wii resulted in significantly less PA compared to traditional lunchbreak

Figure 2. Mean (SD) of Steps/Min between gaming and control conditions



Recommendations

1. The exergaming platform used in any intervention plays a key role in the PA responses to this form of physical activity.
2. In the context of school recess/lunchbreak, exergaming technology could offer an alternative opportunity for children to engage in PA, particularly for children who are not attracted to other more traditional modes of PA.
3. Exergaming as an intervention mode to enhance PA may not be equally effective in enhancing PA in all children and may be better targeted at subgroups of children (e.g., obese boys)